

SERMC Safety SOP 27

From: SERMC Safety (C106)

Subj: SERMC Maritime Confined Space Program

Ref: (a) Navy Maritime Confined Space Program Manual, NAVSEA S6470-AA-SAF-010 (latest revision).  
(b) Naval Ships Technical Manual, NAVSEA S9086-CH-STM-030/CH-074, Gas Free Engineering (latest revision).  
(c) Joint Fleet Maintenance Manual, COMFLTFORCOMINST 4790.3, Volume IV, Chapter 25 (latest revision).  
(d) OSHA 29 CFR 1915 Subpart B  
(e) SERMC NOTICE 4331 "PROCEDURES FOR PERSONNEL USE OF CONTRACTOR SHIPYARD COMPETENT PERSON SERVICES."  
(f) SERMC SOP 43, "SERMC Afloat Hot Work Procedure"  
(g) SERMC SOP 44, "Facility Fire Protection and Prevention Program."  
(h) NFPA 306: Standard for the Control of Gas Hazards on Vessels (as applicable)  
(i) NAVSEA Standard Item 009-07

Encl: (1) SERMC GAS FREE ENGINEERING REQUEST FORM  
(2) HOT WORK REQUIRMENTS  
(3) ENTRY REQUIREMENTS  
(4) CHT, AFFF, OILY WASTE, and SEA WATER SYSTEM WORK SUPPORT REQUIREMENTS  
(5) DIVER SUPPORT REQUIREMENTS  
(6) REFRIGERANT OPERATION REQUIREMENTS  
(7) INSTRUMENT MAINTENANCE  
(8) SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS)

1. Purpose. To provide a local implementing instruction to ensure Southeast Regional Maintenance Center (SERMC) Maritime Confined Space Program compliance with the requirements of references (a) through (d).

2. Cancellation. This revision cancels SOP 27-1, dated 9 JAN 2013.

3. Applicability. This SOP applies to SERMC personnel performing ship repair operations.

**NOTE:** This SOP is only applicable to contractor personnel using SERMC Navy competent services as implemented through an appropriate contract or contract modification in accordance with reference (a).

4. Responsibilities.

a. The Commanding Officer, in accordance with reference (a), will:

(1) Enforce the mandatory requirements of reference (a).

(2) Initiate procedures and directives and require inspections necessary to effect compliance with the standards and regulations prescribed.

(3) Appoint in writing Gas Free Engineer (GFEs) and/or Maritime Confined Space Program Manager (MCSPM).

(3) Provide to the Assistant Deputy Commander, Maintenance, Modernization, Environment, and Safety (SEA 04R), Naval Sea Systems Command a written self-assessment of the command MCSP at least annually.

(4) Document their decision to accept the use of any Contractor Shipyard Competent Person (SYCP) services.

**NOTE:** Reference (e) documents SERMC's Commanding Officer's decision to allow specific personnel to utilize Contractor SYCP services.

b. Supervisors shall:

(1) Ensure personnel comply with the requirements of this SOP and references (a) through (d), and (h) if utilizing the services of a National Fire Protection Association (NFPA) Certified Marine Chemist.

(2) Ensure personnel attend training as required in paragraph 6.a. of this SOP.

**NOTE:** It is the responsibility of the employers of Embedded Contractor Personnel to provide them with training required by reference (d).

(3) Ensure that Navy Competent Persons (NCPs) under their supervision perform assigned tasks and duties in accordance with this SOP and references (a) through (d), as applicable.

c. GFE/MCSPM. GFEs or a MCSPM is responsible for establishing and maintaining this MCSP consistent with the requirements of references (a) through (f) and (h). Additionally, the GFE or MCSPM will:

(1) Provide oversight of contractor confined space operations, including provision of such services for SERMC personnel, to ensure compliance with references (c), (d), (e), (h) and (i), as applicable.

(2) Provide Ship's Force personnel with gas free engineering support in accordance with references (a) through (c).

d. Navy Competent Person (NCP). NCPs will perform the duties and responsibilities in accordance with the requirements of references (a), (d), (f) and (h), this SOP, and as specified by a GFE or the MCSPM.

## 5. Definitions.

Adjacent (Boundary) spaces: Those spaces bordering a subject space in all directions, including all points of contact, corners, diagonals, decks, tank tops, and bulkheads.

Afloat Gas Free Engineer (GFE): Uniformed service members designated as a "Shipboard (Surface Afloat) Gas Free Engineer", in accordance with S9086-CH-STM-030/CH-074V3 (Series).

Certified Marine Chemist (CMC): the holder of a valid Certificate issued by the National Fire Protection Association in accordance with the "Rules for the Certification and Recertification of Marine Chemists" establishing the holder as a person qualified to determine whether construction, alteration, repair, lay-up, or shipbreaking of vessels, which may involve hazards covered by Standard for the Control of Gas Hazards on Vessels, NFPA 306, in its most recent issue, can be undertaken with safety.

Cold work: Any construction, alteration, repair or ship breaking that is not hot work.

Confined space: A space, which by its nature or design:

- (1) Is large enough and so configured that an employee can enter and perform assigned work;
- (2) Has limited or restricted means for entry and exit; and
- (3) Is not designed for normal continuous personnel occupancy.

Confined spaces have one or more of the following characteristics:

- (1) Contains or has a potential to contain a hazardous atmosphere; or
- (2) Lacks natural ventilation; or
- (3) Has or has a potential of an oxygen deficiency or enrichment;
- (4) Can readily create or aggravate a hazardous exposure; or
- (5) Contains any other recognized serious safety or health hazard.

Confined spaces routinely entered by SERMC personnel include, but are not limited to; tanks, voids, boilers (including steam drums and stacks), cofferdams, Gas Turbine Generator Module Exhaust Collectors, Main Condensers, and Log/Fathometer Trunks.

Contaminating operations: Operations which introduce, or have the potential to introduce, hazards into the space, including, but not limited to, hot work, spray finishing, coatings, solvents, inert gases or other flammables, toxic agents, and oxygen displacement, depletion, or enrichment.

Continuous testing: Conducting of tests, by Maritime Confined Space Program personnel, with not more than five (5) minutes between testing.

Enclosed space: A space, other than a confined space, which by its nature or design is enclosed partially or completely by bulkheads, overhead and a deck, is of such a shape, depth or other feature that will restrict natural air movement. As such, any enclosed space has the potential to be or become a poorly-ventilated enclosed space.

Fire watch: A person specifically trained and posted to PREVENT fires, to provide continuous surveillance for Hot Work Safety during hot work operations, as well as to extinguish incipient fires and manage emergency response to hot work situations.

Gas Free Engineer (GFE): The holder of a valid certificate issued by the Navy GFE Certification Board in accordance with the requirements of SECNAVINST 5100.16 (Series) establishing the holder as a person qualified to ensure that confined and poorly-ventilated enclosed space operations incident to construction, overhaul, repair, lay-up, or shipbreaking of naval vessels are undertaken with safety.

Hot work: For the purpose of Maritime Confined Space Program, the term hot work includes all flame heating, welding, torch cutting, brazing, carbon arc gouging and any work which produces heat, by any means, of 400°F (204°C) or more, and, in the presence of flammables or flammable atmospheres, other ignition sources such as spark or arc producing tools or equipment, static discharges, friction, impact, open flames or embers, non-explosion-proof lights, fixtures, motors or equipment are isolated physically from any atmosphere containing 10% or greater of the LEL of a flammable or combustible substance they are not considered to be hot work.

Immediately adjacent: Immediately adjacent, as applied to hot work, means any hot work operations that;

a. Are performed within spaces that are adjacent to spaces containing flammable gases or liquids, with a flash point below 150 °F such as fuel oil or JP-5, when the distance between such spaces and the work is 25 feet or less, or

b. May affect through heat transfer (increase the temperature of in any amount), sparks, or hot slag (by contact or migration into or on) the exterior surface of another space, pipe, or component.

Immediately Dangerous to Life or Health (IDLH): Atmospheres or conditions that may reasonably be expected to become "immediately dangerous to life or health" due to the presence of flammable or explosive vapors at, or in excess of, 10% of the LEL, oxygen content less than 19.5% or greater than 22%, toxic agents which exceed a level from which a person could escape within 30 minutes without impairing symptoms or irreversible health effects or any combination thereof.

Maritime Confined Space Program Manager (MCSPM): A person who administers the confined space program in accordance with this instruction without a GFE certification required by SECNAVINST 5100.16 (Series).

Maritime Confined Space Program (MCSP) personnel: Personnel who perform confined space program functions, including GFEs, MCSPMs, and NCPs.

Naval Maritime Facilities: Those facilities where maritime operations are performed on or in naval vessels or vessel sections. Naval maritime facilities include naval shipyards, ship repair facilities (SRFs), TRIDENT refit facilities (TRFs), regional maintenance centers (RMCs), regional repair centers (RRCs), and other Navy commands whose primary mission involves maritime operations.

Navy Competent Person: MCSP personnel certified by the CO or GFE to have satisfactorily completed the education, experiential, and training requirements specified in reference (a). SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS) for initial designation as an NCP is provided as Enclosure (8).

Navy Occupational Exposure Limit (Navy OEL): Concentrations of chemical contaminants that include:

- a. 1989 Vacated OSHA permissible exposure limits (PELs),
- b. Substance specific regulations issued by OSHA under section 6(b) of the OSH Act of 1970; and
- c. Navy developed standards.
- d. When there is no OSHA PEL or Navy developed standard, the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value (TLV) will be used as the Navy OEL.

Poorly-ventilated enclosed space: An enclosed space that has a lack of adequate air exchange/filtration. The introduction or presence of toxic, flammable, or combustible materials can easily be or become hazardous to personnel entering or working in the space. As such, a poorly ventilated enclosed space will have the same controls as a confined space. With adequate ventilation or the absence of toxic, flammable, or combustible materials, a poorly ventilated enclosed space may be considered a well ventilated enclosed space, and thus not need the same controls as a confined space. Poorly-ventilated enclosed spaces routinely encountered at SERMC include (but are not limited to); closed gas turbine module enclosures, DDG Enclosed Masts, Shaft

Alleys when ship's ventilation has been secured, Uptake spaces, cable and ventilation trunks, Radomes, and Refrigerator rooms.

Retesting/Recertifying: The process of retesting, re-evaluating, and recertifying a confined or poorly ventilated enclosed space under the same procedure required for initial testing and certification when the duration of the certificate expires or conditions occur that alter the initial conditions found or conditions specified.

Safety observer: An individual, who has attended Confined Space Awareness Training, that is positioned to maintain constant visual contact and/or continuous verbal communication with personnel working within confined or poorly-ventilated enclosed spaces.

Ship Repair: Any repair of a vessel including, but not restricted to, alterations, conversions, installations, cleaning, painting, and maintenance work or any employment performed as an incident to or in conjunction with ship repairing, shipbuilding or shipbreaking work, including, but not restricted to, inspection, testing, and employment as a watchman.

Vessel: Vessels include all naval ships, watercraft, barges, floating cranes, derricks, and floating dry docks.

6. Policies. SERMC's policy for Maritime Confined Space operations is that all confined and poorly-ventilated enclosed spaces are considered Immediately Dangerous to Life or Health (IDLH). Entry into or work in or on these spaces is prohibited until personnel have been trained; MCSP personnel have performed tests and evaluations necessary to ensure safe conditions exist and are maintained and/or controls (i.e. ventilation, PPE, respiratory protection) are established to protect personnel from hazards.

a. Training.

(1) Prior to being assigned to work in, on or immediately adjacent to confined or poorly-ventilated enclosed spaces, and every three years thereafter, SERMC personnel will attend SERMC Confined Space Awareness Training (Enterprise Safety Applications Management System, ESAMS, Course ID 4549). This classroom training is based on the requirements of reference (d) and, to the maximum extent practical, NAVSEA Corporate Confined Space Awareness Training.

(2) Prior to performing hot work shipboard, and annually thereafter, SERMC personnel will complete SERMC Shipboard Hot Work Awareness Training (Course ID 6479) Web Training in ESAMS.

(3) SERMC MCSP personnel (GFES, MCSPM, NCPs) will be trained and qualified in accordance with reference (a) and this SOP. Personnel to be certified as NCPs at SERMC will, at a minimum, complete acceptable classroom training and SERMC NCP Personnel Qualification Standard (PQS), detailed in Enclosure (8) to document 120 hours of supervised OJT.

b. Provision of Maritime Confined Space Program (MCSP) Services. SERMC MCSP personnel will provide shipboard gas free services in accordance with references (a) through (d) and this SOP, as applicable.

(1) SERMC personnel will not enter ashore confined spaces without approval from SERMC GFE/MCSPM.

(2) SERMC MCSP personnel may provide competent person services for contractor personnel when a CO approved contract (or contract modification) provides terms and conditions defining the provision of such services and incorporates the requirements of 29 CFR 1915 and paragraph 2-8 of reference (a).

**NOTE:** SERMC MCSP personnel will not provide NFPA CMC services for contractor personnel.

(3) Applicable SERMC personnel may utilize contractor competent person services to enter confined or poorly-ventilated enclosed spaces solely for the purpose of inspecting or monitoring contract performance in accordance with reference (e).

c. Requesting Services. Personnel requiring services from SERMC MCSP personnel should complete Enclosure (1) of this SOP.

(1) Requests should be submitted to the GFE/MCSPM by 1300 hours on the day before services are required.

**NOTE:** Emergent work that cannot meet these time constraints will be evaluated and supported on a case-by-case basis.

(2) Requesting personnel are responsible for verifying pre-inspection requirements on back of Enclosure (1) and hot



work requirements specified in reference (f) prior to testing and inspection by MCSP personnel.

d. Certification of Spaces. SERMC MCSP personnel will post open accessible entrances to confined spaces, poorly-ventilated enclosed spaces and locations of other work operations requiring testing, using NAVSEA Confined Space Program certificates and forms in accordance with reference (a). All personnel are required to read, and follow requirements of these posted certificates and forms.

**NOTE:** If posted SERMC certificates, Contractor Logs, and/or Ship's Logs conflict (i.e. one indicates hot work and the other cold work) then SERMC personnel must stop work, remove SERMC certificates, and notify Maintenance Team and Code 106 GFE/NCP immediately.

e. Certificate Durations. Many operations, due to their potential to generate hazardous conditions, require periodic or continuous monitoring to ensure that safe conditions are maintained.

(1) In accordance with reference (a), unless extended by the GFE, certificates issued for entry and cold work operations will be valid for a maximum duration of 24 hours.

**Note:** Extensions will be based upon GFE/MCSPM knowledge of the space, work operations, prevailing space conditions, and a personal inspection of the space.

(2) Certificate durations for hot work operations are addressed in Enclosure (2).

f. Hot work requirements. SERMC processes and procedures for shipboard hot work operations are specified in reference (f). Requirements, for MCSP personnel performing hot work inspections and certifications are contained in Enclosure (2) of this SOP.

(1) All SERMC shipboard hot work operations will be inspected and certified by SERMC MCSP personnel prior to their starting.

(2) Hot work performed within the SERMC compound, including Bldg. 1488, will comply with the requirements of references (f) and (g) as applicable.

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g. Entry requirements. Specific requirements for entry into confined and poorly-ventilated enclosed spaces are contained in Enclosure (3) of this SOP.

h. Other work operations. The following work operations require MCSP personnel to perform monitoring prior to and during work as well as additional controls to ensure safety.

(1) Collection, Holding, and Transfer (CHT), Aqueous Film Forming Foam (AFFF), Oily Waste, and Sea Water system work in accordance with Enclosure (4).

(2) Diver Support will be provided in accordance with Enclosure (5).

i. Instrument Maintenance Requirements. Instruments will be maintained in accordance with the requirements of enclosure (6).

j. Emergency and Rescue Procedures. SERMC does not maintain the capability to perform emergency rescue and medical treatment. These functions are under the purview and control Ship's Force and Regional/Local Fire and Rescue Departments.

(1) SERMC personnel working onboard ship will report all emergencies to Ship's Force personnel.

**NOTE:** The Ship's GFE, who is responsible for directing and coordinating rescue operations, in accordance with Section 25 of reference (b), will request assistance from Regional/Local Fire and Rescue Department or SERMC MCSP personnel support at their discretion.

(2) SERMC MCSP personnel will provide equipment and assistance as requested.

(3) SERMC GFEs or MCSPM will:

(i) Upon request from Ship's Force and/or Regional/Local Fire and Rescue Departments, review and provide comments to established rescue plans/procedures to ensure compliance with reference (a).

(ii) When notified, observe ship's force semi-annual drills conducted in accordance with reference (b).

(iii) Forward results of reviews to Commander, Navy Regional Maintenance Center (CNRMC) and Naval Sea Systems

Command, Safety (SEA 04R), as part of the annual self-assessments.

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Aaron E. Moore, C106

The Requester(s) must ensure adequate isolation of systems to be certified (i.e. WAF/tag out), provide personnel to act as a Safety Observer if entering confined or poorly-ventilated enclosed spaces, and verify exact scope of work as requested. Certificates will be issued based on conditions noted at time of inspection and will identify necessary requirements or restrictions to maintain safe working conditions throughout scope of work.

**CONTACT INFORMATION:**

Requestor's Name/Command/Code/Shop:

Requestor's phone #/email:

Vessel name and hull #:

Location of vessel:

Requested inspection date and time:

The logo for NAVSEA Regional Maintenance Center features the word "NAVSEA" in large, bold, white letters with a blue outline, set against a blue background with a white ship silhouette. Below it, "REGIONAL MAINTENANCE CENTER" is written in smaller white letters.**JOB SPECIFIC INFORMATION:** Southeast

JSN/Work Item/SSP/DSR/WAF #:

System/components (e.g. AFFF/CHT/ JP-5 tank, pipe/valve #):

Specific location(s) (Compartment name, # and specific location in compartment):

Adjacent spaces affected by work to be accomplished:

Job description (e.g. valve replace/type of hot work/inspection):

**MINIMUM REQUIREMENTS FOR SERVICES:**

1. Pre-inspection requirements must be completed before a Gas Free Inspection will be performed. It is the Requester's responsibility to assure these requirements have been completed. See MINIMUM GFE PRE-INSPECTION REQUIREMENTS on the back side of this document.

**Submit request form to SERMC Gas Free by 1300 on the day before service is requested.**

**SERMC C106 NOTES:**

**SERMC GAS FREE ENGINEERING PRE-INSPECTION REQUIREMENTS****MINIMUM REQUIREMENTS FOR ENTRY INTO CONFINED OR POORLY-VENTILATED ENCLOSED SPACES.**

- ☐ ENSURE piping and components that can allow liquid or gases into the tank or space have been isolated in accordance with the JFMM and TUM.
- ☐ ENSURE residual liquid has been pumped out of tank or space (at least to low suction).
- ☐ Ensure tanks and spaces (i.e. fuel and CHT tanks) known to contain toxic contaminants have been placed under negative pressure (i.e. ventilation ducting has been routed into the space and fan/blower has been routed overboard).
- ☐ Have a qualified SAFETY OBSERVER available prior to entry.

**MINIMUM REQUIREMENTS FOR HOT WORK.**

- ☐ All appropriate Ship's Force personnel have been notified of hot work to be performed.
- ☐ Affected systems have been tagged-out in accordance with JFMM and TUM.
- ☐ All flammables have been removed from the hot work area.
- ☐ All combustibles within 35' of the hot work area have been removed or protected by fire retardant material.
- ☐ Minimum strip-back requirements for materials, on both sides of the hot work area, have been met. These requirements are specified in SERMC SOP (a).
- ☐ Systems affected by the hot work have been isolated, drained, and flushed.
- ☐ Temporary services required to support hot work (i.e. negative pressure ventilation, lighting, firefighting equipment, etc.) are available for use.
- ☐ Trained Fire Watch personnel with proper equipment (fire extinguisher, PPE, etc.) have been assigned to all areas affected by hot work.

**CHT/SANITARY SYSTEM/AFFF MINIMUM OPENING REQUIREMENTS**

- ☐ Do not open a tank or associated piping without the presence of the gas free engineer.
- ☐ Pump out the tank, and/or any piping that will be opened to the atmosphere. (*Remove the waste material.*)
- ☐ CHT/ SANITARY TANK: Fill the tank with water and pump out a minimum of three times.
- ☐ PUMPS AND PIPING: Flush the system to remove residual waste and potential toxic gases.
- ☐ Ensure the system is isolated in accordance with JFMM and TUM to prevent the flow of liquids or gases into the system being opened.
- ☐ Install negative pressure ventilation at the immediate location of the system to be opened and exhaust to open atmosphere.
- ☐ Have available containments to capture any spills, protect ship's equipment, and to allow personnel to remove required PPE before exiting the work area.
- ☐ Have PPE to prevent skin, eye, and street clothing contact with system contents.
- ☐ Have required respiratory protection.
- ☐ Opening, WITHOUT ENTRY, of flushed and isolated CHT piping or tanks requires a minimum of a full face air-purifying 3M 6000 Series respirator with 6006 Multi Gas Cartridges (approved for escape from hydrogen sulfide containing atmospheres).
- ☐ Entry into an unclean CHT Tank requires a minimum of a full face supplied air respirator with air-escape or an SCBA.

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1. SERMC's policy is that all shipboard hot work will be considered dangerous and that SOP 43, SERMC Afloat Hot Work Procedure, process specific requirements will be implemented to reduce the risk of fire when performing hot work shipboard.

2. Hot work includes the following operations:

a. Flame heating, welding, torch cutting, plasma cutting, brazing, carbon arc gouging, or grinding.

b. Work which produces heat, by any means, of 400°F (204°C), or more.

c. Drilling, abrasive blasting, needle-gunning or similar spark-producing operations EXCEPT when such operations are isolated physically from any atmosphere containing 10 percent or greater of the Lower Explosive Limit of a flammable or combustible substance.

4. Prior to the start of any SERMC shipboard hot work, SERMC MCSP personnel will inspect and authorize work areas to ensure compliance with the requirements of reference (a) through (f).

a. A Certified Gas Free Engineer (GFE) or NFPA Certified Marine Chemist (CMC) will provide *initial* Hot Work certification for:

(1) Hot work within, on, or immediately adjacent to spaces that contain or have contained combustible or flammable liquids or gases.

(2) Immediately adjacent to fuel tanks that contain or have last contained fuel;

(3) On pipelines, heating coils, pump fittings or other accessories connected to spaces that contain or have last contained fuel; and

(4) Within spaces adjacent to spaces containing flammable gases or liquids with a flash point below 150°F when the distance between such spaces and the work is less than 25 feet.

b. SERMC NCPs may provide hot work certifications for:

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(1) Areas not requiring initial certification by a Certified GFE or NFPA CMC.

(2) Areas previously certified by a Navy GFE or NFPA CMC.

5. Minimum requirements necessary for MCSP personnel to provide a "Safe For Hot Work" certification include:

a. Confined or poorly ventilated enclosed spaces must be certified "Safe For Entry" to prepare (i.e. cleaning, paint removal, blanking, plugging, etc.) for and perform hot work within, on, or against them unless an alternate method such as steam blanketing, pressing-up with water, or rendering the internal atmosphere inert is going to be used.

**NOTE:** Only a GFE or NFPA CMC may authorize and certify use of an alternate method when used in place of certification.

b. Removable combustible material such as, paper, wood, ship's stores, trash, and supplies must be removed at least 35' from work site.

**NOTE:** It is understood that worker clothing, temporary services, and parts of tools are combustible and must be introduced into the work area however, every effort must be made to minimize these materials or substitute them with non-combustible materials. In all cases, necessary materials must be protected.

c. Fixed combustible materials, outside of required minimum strip-back distances, including cabling, decking, equipment, desks and even paint, must be adequately protected to prevent the spread of fire. Methods of protection can include adequate separation distances or covering with heat and flame resistant metal, guards, curtains, or containment materials.

d. Flammable materials, as well as operations requiring the use of these materials, such as solvents, paints, and adhesives, are not permitted within spaces, or within 35' of areas, posted "Safe For Hot Work."

**NOTE:** Additional separation distance may be needed depending on work specific factors (i.e., wind direction, potential for spark/slag migration, vertical separation, exhaust ventilation, etc.) unless authorized by a GFE or CMC.

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e. Soft preservatives (such as Cosmoline®, petrolatum, and Heavy Marine Fluid Film) coating spaces, inaccessible voids, or structural components.

(1) Before hot work involving accessible spaces coated with soft preservatives can be performed, those preservatives must be stripped back from the area of the hot work for a distance not less than 12" on all sides from the outermost limits of the hot work to prevent outgassing and ignition from heat, sparks, slag, etc., whichever is greater.

(2) Before hot work can be performed on inaccessible items (such as rudders, gudgeons, bilge keels, skegs, stabilizers, structural voids, etc.) containing soft preservatives those items will be either:

- i. Steam cleaned,
- ii. Pressed-up with water, or
- iii. Have their internal atmospheres rendered inert.

**NOTE:** A Certified GFE or NFPA CMC must authorize and provide the initial certification for these methods.

**NOTE:** In all cases where hot work is performed near soft preservatives a pressurized 1-1/2 inch, or larger, fire hose with a fog nozzle will be immediately available during, and for 30 minutes after hot work is completed.

f. Strip-back distances. Paint, various types of insulation, lagging, Passive Countermeasures Systems (PCMS) tile, etc. can be damaged or ignited by or through spark migration, slag contact, or heat transfer.

(1) These materials often have minimum strip-back requirements invoked by technical instructions, not safety requirements, which must be strictly adhered to.

(2) SERMC MCSP personnel will ensure minimum strip-back requirements, identified in the table below, are met unless waived by a GFE in accordance with reference (a).



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<b>Strip-back Distances For Heat Sensitive Material</b>		
MATERIAL TYPE	STRIPBACK DISTANCES (NOTES)	
	HOTWORK SIDE	OPPOSITE SIDE
HULL INSULATION (PVC)		
Thermal Cutting (torch, carbon, plasma)	36"	36"
SMAW, GMAW, Brazing, Strip Heaters	24"	24"
GTAW, Grinding, Auto Timed Stud Welding	12"	12"
FIBERGLASS INSULATION	6"	6"
PCMS material	6"	6"
SOUND DAMPENING (Not PVC or SHT)	6"	6"
ALL PAINT including TOXIC COATINGS (i.e. paint containing lead, cadmium, chromium or galvanized metal, etc.)	4"	4"
ULTRA HIGH SOLID PAINT		
Thermal Cutting (torch, arcing, plasma)	8"	8"
All other hot work	4"	4"
SPECIAL HULL TREATMENT (SHT)	12"	12"
TILE, DECKING, MASTICS, GRAPHITE, ETC	12"	12"
SPRAY IN FOAM INSULATION	24"	12"
<b>NOTES:</b> <ul style="list-style-type: none"> <li>• With the exception of paint, the exposed edges of material surrounding the hot work area must be protected with a wetted Refrasil® cloth, or equivalent, to prevent slag/spark contact.</li> <li>• If materials are contaminated with fuel, oil, or solvents strip-back distances must be increased by a minimum of 12".</li> <li>• Thermal cutting through plate or structures requires HOTWORK SIDE strip-back distances to be maintained on both sides of the plate/structure being cut through.</li> </ul> <b>NOTE: These are minimum strip-back distances additional material may need to be removed based on actual worksite conditions.</b>		

g. Isolation of work area. Pipes, tubes, penetrations, or similar openings that can discharge, backflow, or otherwise allow material back into the hot work area must be closed, isolated (i.e. tagged/locked out) in addition to having the opening(s) blanked, plugged, or capped.

h. Fire watches. Fire watches will be required for all SERMC shipboard hot work.

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(1) MCSP personnel may specify posting of fire watches. However, briefing of fire watches is the responsibility of the hot work operator and their supervision.

(2) In cases where sparks or slag may involve more than one level, as in trunks, machinery spaces, and scaffolding, a fire watch will be required at each level unless positive means are available to prevent the spread or fall of hot material.

i. Pipes, Tubes, and Coils. Hot work will only be certified on these items after they have been;

(1) Depressurized and opened,

(2) Flushed, blown down, purged/rendered inert, or otherwise cleaned, and

(3) Isolated from the system to which they are connected.

j. Inaccessible/Closed Spaces or Structures: In order to prevent the build-up of pressure, items such stanchions and hollow tube brackets will be (and must remain) vented before (and during) hot work or heating operations that are performed on them. Additionally, the atmosphere inside of these structures will be tested to verify that they are not flammable or explosive.

**NOTE:** If testing indicates the presence of flammable atmosphere or flammable or combustible preservative material SERMC's GFE must be notified immediately.

k. Magazines. Hot Work near loaded magazines will be handled in accordance with NAVSEA OP 4, Ammunition and Explosives Safety Afloat. Obtaining Event Waivers and Landlord (NAVSTA MAYPORT) Concurrence is the ship's responsibility.

l. Fueling. Unless previously approved by the ship's CO and the SERMC GFE, hot work operations will be secured during refueling, defueling, and fuel transfer operations (including JP-5 operations).

(1) Hot work internal to the skin of the ship may be permitted during these operations if it has been previously approved by the ship's CO and the SERMC GFE.

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(2) SERMC GFE will walk the entire fuel transfer path with a designated ship's representative and verify that hot work will not occur:

i. Within spaces containing effected piping (transfer, stripping, air escape, etc.),

ii. Within spaces adjacent to tanks, impacted by fueling operations,

iii. Against the skin of the ship near the refueling barge or station,

(3) After inspection and approval the integrity of the fuel system involved in refueling, defueling, or fuel transfer operations will be verified by walking involved components, again, prior to hot work starting in approved areas.

m. Waivers of backside hot work requirements. In accordance with NAVSEA S6470-AA-SAF-010, Maritime Confined Space Program Manual; "When, based on objective evidence (e.g., mock-up testing by a welding engineer, etc.), the temperature will not reach or exceed 400°F (204 °C) on the opposite side, the requirements pertaining to hot work for the opposite side (e.g. "Safe For Hot Work" certification, fire watch, and insulation removal) can be waived by the Gas Free Engineer.

n. Certificate posting and periodicity. Copies of hot work certificates will be posted at the access, or accesses, to all affected spaces and at the work site.

**NOTE:** The original certificate will be turned in to the SERMC GFE to be kept on file in accordance with reference (a).

(1) Certificates issued to support hot work will be issued for the time necessary to perform hot work.

(1) Hot work certificates for SERMC work will never be issued for a period exceeding 10 hours unless approved by the SERMC GFE.

o. Engineering controls and Personnel Protective Equipment for hot work operations. In addition to burn, ultraviolet light, electrical shock, and fire hazards, hot work processes have the potential to use and generate gases and hazardous fumes.

SERMC Maritime Confined Space Program  
HOT WORK REQUIREMENTS

SERMC Safety SOP 27

(1) The primary method of protecting personnel will be to utilize engineering controls such as containments and ventilation.

(2) When engineering controls are not adequate or feasible, due to the nature of the work or space, personnel will be required to utilize those controls to the maximum extent possible and respiratory protection.

(3) Job specific controls will be identified in Job Hazard Analyses (JHAs), Industrial Hygiene Surveys, SOPs, or will be prescribed by the GFE.

SERMC Maritime Confined Space Program  
ENTRY REQUIREMENTS

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Below are the Confined Space Program procedures for entry into and performing cold work within confined or poorly-ventilated enclosed spaces.

1. SAFETY OBSERVER. A Safety Observer will be positioned to maintain constant visual contact and/or continuous verbal communication with personnel working within confined spaces. Safety Observers will:

a. Not conduct other duties that would interfere with their ability to maintain communication with personnel working within confined spaces.

b. Direct immediate evacuation if unsafe conditions are noted or ship's alarms are sounded.

c. Report all emergencies immediately to the Ship's Quarterdeck.

d. Have received confined space awareness training, be a Ship's Force representative, or be ship repair contractor personnel that has met the requirements of SERMC Local Standard Item 099-74SE.

**NOTE:** Prior to using contractor personnel to act as a safety observer, the assigned Maintenance Team must be notified to ensure contractual requirements are met.

e. Prior to entering any confined or poorly-ventilated enclosed spaces, read and verify that a valid Confined Space Certificate and/or Log of Test and Inspection has been posted at the entrance for their work.

2. CERTIFICATION. MCSP personnel will, from outside the space, perform tests in the following order and will include:

a. Oxygen (19.5% to 22% with 20.8% being optimal).

b. Combustible/Flammable atmospheres, lower explosive limit (LEL) (< 10%).

(1) Concentrations of flammable or combustible materials can exceed Navy OELs well before they create a flammable atmosphere.

(2) Although OSHA and NAVOSH recognize an LEL reading up to 10% as the limit for providing a "Safe For Entry"

SERMC Maritime Confined Space Program  
ENTRY REQUIREMENTS

SERMC Safety SOP 27

certification for a space, ANY detected LEL readings must be investigated to ensure a possible toxic exposure cannot occur.

c. Suspected toxics will be tested for based on:

(1) Previous and/or current contents of the space (i.e. concentrations of volatile organic compounds (VOCs)/total hydrocarbons (THCs) will be tested for in fuel oil or JP-5 tanks). Due to instrument variability, SERMC NCPs will not certify entry into fuel oil or JP-5 tanks containing VOC concentrations of 25 ppm or greater without direction from the GFE.

(2) Systems to be opened or in the space (i.e. CO<sub>2</sub> from fire suppression systems, and H<sub>2</sub>S associated with CHT, AFFF, Oily Waste systems, halocarbons associated with refrigerant systems,

(3) Processes to be performed (i.e. VOCs/THCs when solvent cleaning is performed or CO during hot work processes).

(4) Personnel occupancy of space (CO<sub>2</sub> from breathing).

(5) The GFEs direction.

d. Visual inspection for physical hazards including broken ladders, piping, and other structural features that present slip, trip, and fall hazards. MCSP personnel will check for sludge, residual liquid, and other conditions (such as blistering paint) that can trap/contain materials.

e. When initial tests from outside of the space do not indicate the presence of hazardous concentrations of flammables or toxics or deviations from normal oxygen levels, the space will be entered and all previously mentioned tests will be performed progressively throughout the space.

f. When all conditions have been verified acceptable, MCSP personnel may post the requested certification.

(1) Copies of certificates will be posted at all usable accesses for the space and at the worksite.

(2) Certificates that conflict with posted contractor or Ship's Force logs must never be posted.

(3) If SERMC work will conflict with posted contractor or Ship's Force logs then certification will not be provided and

SERMC Maritime Confined Space Program  
ENTRY REQUIREMENTS

SERMC Safety SOP 27

SERMC management and GFE must be notified.

(4) The original certificate will be turned in to the SERMC GFE to be kept on file in accordance with reference (a)

g. If unsatisfactory conditions are noted, MCSP personnel will post the space as necessary, to reflect conditions, and notify the requesting party, the ship, and the SERMC GFE.

(1) If conditions are found that prohibit certification of a space that has been previously certified by contractor or Ship's Force those parties will also be notified of conditions found.

(2) If IDLH conditions are found in a space that has been previously certified by contractor or Ship's Force then SERMC personnel will ensure that the space is evacuated, remove and retain all previous postings for the space, notify Ship's Force, SERMC Safety, the Maintenance Team, and all affected parties.

3. Recertification Periodicity. General recertification and testing policies include;

a. Except as noted below, certificates issued for entry and cold work not involving solvent or chemical use or exposure to hazardous materials will be issued for a maximum duration of 24 hours unless extended by SERMC's GFE.

b. The following spaces/cold work operations will have certificates issued for a maximum duration of eight (8) hours unless extended by SERMC's GFE.

(1) Unclean spaces containing or having last contained bulk quantities of combustible or flammable liquids or gases (i.e. fuel and JP-5 tanks);

(2) Work involving the use of flammable or combustible solvents or materials;

(3) Painting with or use of flammable or combustible liquids.

**NOTE:** No single rule can be established for all operations and conditions. When work not noted above will be performed the SERMC GFE will establish the type and frequency of testing.

SERMC Maritime Confined Space Program  
CHT, AFFF, OILY WASTE, and SEA WATER SYSTEM WORK REQUIREMENTS  
SERMC Safety SOP 27

Sewage/Collection, Holding and Transfer (CHT), Aqueous Film Forming Foam (AFFF), and Oily Waste Collection system holding tanks, pipes, and components have the potential to contain Immediately Dangerous to Life or Health (IDLH) atmospheres. Organic material and bacteria present in these systems can easily and rapidly generate dangerous concentrations of hydrogen sulfide (H<sub>2</sub>S), carbon dioxide (CO<sub>2</sub>), explosive gasses (methane) and create oxygen deficient atmospheres.

1. **CHT GENERAL REQUIREMENTS.** SERMC work requiring the removal or disassembly of CHT system valves, pumps, flanges, or disabling of CHT Pump Room sensors or alarms or working in spaces where such work will be performed will be conducted in accordance with the following minimum requirements:

**NOTE:** SERMC WILL NOT PERFORM ENTRY INTO UNCLEAN SEWAGE OR GREY WATER TANKS.

a. Isolation/Flushing/Cleaning.

(1) All associated facilities (heads, showers, receiving stations, etc.) that drain into or through or ventilate the component to be opened or removed will be secured.

(2) Systems, or components, will have been filled and flushed with sea water a minimum of three times and drained to low suction.

(3) Components to be removed or sections of system to be opened will be isolated in accordance with the JFMM/TUM with at least two points of isolation (i.e. valves, blanks, etc.) between them and holding tanks or the remainder of the system.

b. Ventilation requirements. Exhaust to weather ventilation must be present and operating during SERMC opening or removal CHT components. SERMC MCSP personnel will verify that either;

(1) Ship's exhaust to weather ventilation is operating when inside sewage or gray water system pump rooms or below holding tank overflows or

(2) Temporary exhaust to weather ventilation is installed, capable of reaching openings, and is operating.



SERMC Maritime Confined Space Program  
CHT, AFFF, OILY WASTE, and SEA WATER SYSTEM WORK REQUIREMENTS

SERMC Safety SOP 27

**Note:** SERMC C900 only maintains one Temporary Exhaust ventilation system.

c. Atmospheric Monitoring. SERMC MCSP personnel will perform testing and monitoring when SERMC personnel are present during, or are performing, opening of CHT systems or when CHT Pump Room sensors or alarms are disabled.

(1) Immediately at the physical point of system opening during opening and

(2) Continuously, in the affected compartments where components are being opened, at the and while the tank or component remains opened. Atmospheric concentrations will be verified as:

- i. Oxygen (19.5% to 22%),
- ii. Explosive gases (< 10% LEL),
- iii. Hydrogen sulfide (< 10 ppm),
- iv. Carbon monoxide (<35 ppm), and
- v. Carbon dioxide (<0.5%, 5000 ppm).

WARNING! If at any time during the evolution general area atmospheric conditions become deficient, personnel will evacuate the space immediately, ensure exhaust to weather ventilation is operating, and notify Ship's Force (including the QD), their supervision, and SERMC GFE.

d. Respiratory Protection. Unless authorized by the GFE, personnel opening sewage/CHT or waste water system piping, or components located below the holding tank overflow will wear a minimum of a full-face air purifying respirator with cartridges approved for escape from hydrogen sulfide containing atmospheres. SERMC's stock 3M 6000 Series respirator with 6006 Multi Gas Cartridges meets these requirements.

Opening CHT or sanitary systems or components above the holding tank overflow that have been isolated and flushed does not require respiratory protection, unless directed by the GFE.

e. Personal Protective Equipment (PPE). When performing maintenance, which requires disassembly of sewage or gray water equipment or when contact with sewage or gray water is possible,

SERMC Maritime Confined Space Program  
CHT, AFFF, OILY WASTE, and SEA WATER SYSTEM WORK REQUIREMENTS

SERMC Safety SOP 27

rubber gloves, rubber boots, eye/face shields and coveralls will be worn, as necessary, to prevent skin/clothing contact with system contents. Tyvek® coveralls may also be required.

(1) In no case will personnel walk through living, eating, working, or manned spaces wearing PPE that has been exposed to sewage, grey water, or flushing water. Used materials will be handled as follows;

(2) Used disposable PPE, rags, and other generated waste will be bagged, sealed, and disposed of in accordance with direction of SERMC Environmental Coordinators.

(3) Non-disposable PPE and tools will be cleaned with approved disinfectants or washed with warm water and soap, rinsed with fresh water, and allowed to completely dry prior to re-use.

e. Lay-down/Staging Areas/Catches/Containments. To capture any spills, protect ship's equipment, and to allow personnel to remove contaminated PPE before exiting the work area personnel will use plastic bags or sheeting, as necessary.

f. Training/Briefing. SERMC personnel opening CHT systems, components, or who may handle or come in contact with sewage-contaminated equipment must have;

(1) Received a brief regarding the hazards (explosive gases, toxic gases, health hazards) associated with such work.

(2) Have received a CHT "WASTEWATER/SEWAGE WORKER 702" physical in accordance with NEHC-TM OM 6260.1, MEDICAL SURVEILLANCE PROCEDURES MANUAL AND MEDICAL MATRIX (LATEST EDITION)

g. Spill Response. Any spread of liquid or material beyond lay-down/staging areas/catches/containments inside of the ship will be immediately reported to the ship's Quarterdeck.

2. AFFF, OILY WASTE, and SEA WATER SYSTEMS. When opening these systems, or components the following minimum requirements will be met:

a. Isolation/Draining. Tank and components of these systems will be secured and isolated in accordance with the JFMM/TUMS and drained prior to opening.

SERMC Maritime Confined Space Program  
CHT, AFFF, OILY WASTE, and SEA WATER SYSTEM WORK REQUIREMENTS  
SERMC Safety SOP 27

b. Atmospheric Monitoring. SERMC MCSP personnel will perform testing and monitoring when SERMC personnel are present during, or are performing, opening of these systems. Atmospheric concentrations will be verified as:

- (1) Oxygen (19.5% to 22%),
- (2) Explosive gases (< 10% LEL),
- (3) Hydrogen sulfide (< 10 ppm),
- (4) Carbon monoxide (<35 ppm),
- (5) Carbon dioxide (<0.5%, 5000 ppm),
- (6) For oily waste systems, VOCs (<25 0ppm).

**WARNING!** If at any time during the system opening general area atmospheric conditions become deficient evacuate the area immediately, ensure exhaust to weather ventilation is operating, immediately notify Ship's Force (including the QD), Maintenance Team, and the SERMC GFE.

c. Ventilation requirements. Exhaust to weather ventilation must be present and operating during SERMC opening or removal of these systems. SERMC MCSP personnel will verify that either;

- (1) Ship's exhaust to weather ventilation is operating  
or
- (2) Temporary exhaust to weather ventilation is installed, capable of reaching openings, and is operating.

**Note:** SERMC C900 only maintains one Temporary Exhaust ventilation system.

d. Respiratory Protection. Respiratory protection requirements for opening AFFF, Oily Waste, and/or Seawater systems will be specified by the GFE in coordination with the SERMC RPPM.

e. Personal Protective Equipment. When performing maintenance, which requires opening of AFFF/Oily Waste/Sea Water systems rubber gloves, rubber boots, eye/face shields and coveralls will be worn, as necessary, to prevent skin/street clothing contact with system contents.

SERMC Maritime Confined Space Program  
CHT, AFFF, OILY WASTE, and SEA WATER SYSTEM WORK REQUIREMENTS  
SERMC Safety SOP 27

f. Lay-down/Staging Areas/Catches/Containments. Personnel will use plastic bags or sheeting, as necessary to capture any spills, protect ship's equipment, and to allow personnel to remove contaminated PPE when opening AFFF/Oily Waste/Sea Water systems

SERMC Maritime Confined Space Program  
DIVER SUPPORT REQUIREMENTS

SERMC Safety SOP 27

Elevated pressures associated with hyperbaric work increase the toxic effects of gasses. Atmospheric testing is necessary prior to permitting personnel entry into hyperbaric atmospheres and while personnel work in them. Due to pressure sensitivities of meters and time constraints associated with hyperbaric work, direct reading instruments generally cannot be carried into hyperbaric atmospheres.

**Note:** Surface ship sonar dome entry is not controlled as a "Gas Free" process. All questions regarding this work must be directed to the GFE.

The following processes will be used to certify and monitor hyperbaric work for diver operations where divers hard hats (i.e. diving masks) will be removed.

a. Certification and monitoring will always include testing for oxygen, LEL, carbon monoxide, hydrogen sulfide, and carbon dioxide.

**Note:** Solvent/chemical or hot work processes use will require evaluation by the SERMC GFE.

b. A method of drawing air from within the hyperbaric atmosphere will be devised so that analysis can be performed at standard atmospheric pressure.

(1) For cofferdam or submarine ballast tank entry and work, diving personnel, while wearing equipment, will extend tubing from inside the cofferdam/tank to the surface so air can be drawn into a plastic bag. Tubing must be capable of being sealed to prevent introduction of water and venting the cofferdam/tank.

(2) For pressurized spaces, a piping path and exhaust will be used to draw air into a plastic bag. Ensure piping can be isolated to prevent rapid depressurization of space.

(3) The depth or pressure of the hyperbaric atmosphere to be tested will be identified and compared to the values on Table (1) of this enclosure to determine hyperbaric OELs to be used for certification and monitoring.

**Note:** If a depth, atmosphere (ata), or pressure falls between two rows on Table (1) than the row associated with the greater ata will be used to determine applicable OELs.

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DIVER SUPPORT REQUIREMENTS

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(4) Once readings have been verified the space can be certified Safe For Entry--Not Safe For Hot Work for a maximum duration of 4 hours with additional incremental testing required, performed as often as requested by the Diving Officer. However, the duration between testing will never exceed one hour.

i. If any sampling results are found to exceed levels noted in Table (1) the diving officer will be notified immediately so that corrective action (i.e. increasing air flow, donning mask, evacuation, etc.) can be taken and sampling will be performed continuously.

ii. If after 30 minutes of testing sampling results corrective actions have not lowered levels previously noted evacuation of space and SERMC GFE evaluation will be required.

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DIVER SUPPORT REQUIREMENTS

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Depth in Feet	ata	Pressure in p.s.i.	Oxygen (%)	Carbon Dioxide		CO (ppm)	H <sub>2</sub> S (ppm)
				(%)	ppm		
0	1	14.7	19.5 - 22	0.5	5000	35	10
5	1.15	16.91		0.5	5000	33	9
10	1.3	19.11		0.5	5000	24	7
15	1.45	21.32		0.5	5000	23	6
20	1.6	23.52		0.5	5000	21	6
25	1.78	26.17		0.5	5000	19	5
30	1.9	27.93		0.5	5000	18	5
34	2.03	29.84		0.4	4000	17	4
35	2.06	30.28		0.4	4000	17	4
40	2.21	32.49		0.4	4000	15	4
45	2.36	34.69		0.4	4000	14	4
50	2.51	36.90		0.3	3000	13	3

TABLE (1)<sup>1</sup>

<sup>1</sup>Developed by information derived from SIMANORFOLKINST 5100.11A.

SERMC Maritime Confined Space Program  
REFRIGERANT OPERATION REQUIREMENTS

SERMC Safety SOP 27

Refrigerant is a general term used to identify a number of products used in shipyards under synonyms such as fluorocarbons (i.e. R-134 A, HFC-236FA, etc.), chlorofluorocarbons (i.e. R-12, R-22, etc.), Freon®, etc. These materials are used as air conditioning fluids/gases, cleaning/flushing solvents, and leak testing mediums. Refrigerant vapors are much heavier than air and can act as an asphyxiant by displacing the atmosphere in a space. Although refrigerant vapors generally will not burn, they will decompose into toxic by-products when exposed to heat and ultraviolet light.

Refrigerants containing chlorine will decompose into hydrochloric acid and poisonous phosgene gas. Those containing fluorine will decompose into hydrofluoric acid.

The majority of equipment SERMC will work with, or around, contains the following types of refrigerants:

R-22	CHClF <sub>2</sub>	<b>These refrigerants are used aboard naval ships in the following systems:</b> <b>a. Refrigerated ship stores</b> <b>b. Refrigerated cargo</b> <b>c. Air conditioning</b>
R-114	CClF <sub>2</sub> CClF <sub>2</sub>	
R-134a	CF <sub>3</sub> CH <sub>2</sub> F	
R-236fa	CF <sub>3</sub> CH <sub>2</sub> CF <sub>3</sub>	
R-404a	Blend	<b>Used in self-contained refrigeration equipment such as soda and ice cream machines.</b>
R-422b	Blend	

a. Atmospheric Monitoring. SERMC MCSP personnel will perform monitoring when SERMC personnel are performing charging, draining, or pressure testing of refrigerant systems or present when Ship's Force personnel are performing those operations.

**Note:** In accordance with NAVSEA Standard Item 009-61, contractors performing these operations are required to provide a halide monitor with alarm or equivalent instrument to continuously monitor the atmosphere in spaces where fluorocarbon compounds are used.

(1) When checking for refrigerants an Altair® meter will be used to continuously monitor oxygen levels (19.5% to 22%) and LEL (<10% LEL).

(2) The Bacharach PGM-IR will be used to check for refrigerants. Any general area concentration of refrigerants in



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REFRIGERANT OPERATION REQUIREMENTS

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excess of **850 ppm will be cause for immediate evacuation** of the space.

**Note:** In accordance with NSTM 516, "All Navy approved refrigerants are considered non-toxic when maintained below the allowable exposure limit of 1,000 ppm (8-hour time-weighted average) recommended by the National Institute for Occupational Safety and Health (NIOSH) or American Conference of Governmental Industrial Hygienists (ACGIH)." *However, the 850ppm concentration noted above is set to ensure consistency with the ship's installed halocarbon monitor set points identified in paragraphs 516-2.6.3 and 516-2.6.4.*

b. Ventilation requirements. Exhaust to weather negative pressure exhaust ventilation must be present and operating when SERMC personnel perform refrigerant work or are working in spaces where refrigerant operations are being performed. SERMC MCSP personnel will verify that either;

(1) Ensure that each compartment containing a refrigeration plant has ventilation with the exhaust intake duct located about 9 inches off the deck or

(2) Ensure Contractor refrigerant operations have temporary ventilation installed in accordance with NAVSEA Standard Item 009-61.

c. Hot work requirements. All hot work will be suspended in spaces before charging or draining refrigerants.

(1) Open flame, welding, or hot surfaces (greater than 750 °F) such as space heaters (Salamanders or other types) will decompose halogenated refrigerants into extremely toxic materials.

(2) Hot will not be permitted when general atmospheric refrigerant concentrations exceed 25 ppm refrigerant.

(3) Refrigerant piping will be purged with nitrogen before and while hot work is being performed on them.

SERMC Maritime Confined Space Program  
INSTRUMENT MAINTENANCE REQUIREMENTS

SERMC Safety SOP 27

Instruments will be tested per manufacturer's instructions against a known "gas" standard. A record will be maintained of all calibration and bump tests. When an instrument fails calibration/bump tests, the instrument will be removed from service.

Failure to properly use and maintain instruments can result in injury and death. Only trained confined space program personnel will use and maintain instruments used for certifying spaces and processes covered by this SOP.

1. Instrument function tests, as prescribed by manufacturer instructions, will be performed each day before use and any time the meter has been turned off and turned back on. An instrument function test will include, at a minimum;

a. A blocked pump flow test, as applicable, will be performed by plugging the sampling inlet and verifying a pump failure alarm and

b. A Bump Test, where the instrument is connected to a known standard for each sensor to verify proper operation.

c. The instrument must pass both tests before it can be placed in service. If a meter fails a bump test it must be removed from service and calibrated in accordance with manufacturer's instructions.

2. A record (see sheets two and three of this enclosure) of all daily instrument function tests will be completed with each test.

3. Sensor change out or cleaning will be performed in accordance with manufacturer's instructions in the presence of, or by, the GFE.

**NOTE:** Issues that cannot be resolved by performing calibration, cleaning, or sensor(s) change will be remitted to the instrument manufacturer.

SERMC Maritime Confined Space Program  
INSTRUMENT MAINTENANCE REQUIREMENTS

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MSA ALTAIR									
Date	Serial #	Pump Fail Alarm	% O2	% LEL	CO PPM	H2S PPM	%CO2	COMMENTS	Signature
			14-16	52-64	54-66	18-23	2.3-2.6		

SERMC Safety SOP 27

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SERMC Maritime Confined Space Program  
SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS)

SERMC Safety SOP 27

NCP TRAINEE: \_\_\_\_\_

Navy competent persons (NCPs), in accordance with the NAVSEA S6470-AA-SAF-010 "Maritime Confined Space Program Manual" once designated are responsible for:

- Entering confined and poorly ventilated enclosed spaces or locations and other potentially hazardous atmospheres,
- Conducting atmospheric tests,
- Conducting visual inspections, and
- Determining if conditions are conducive for cold or hot work to be safely conducted therein, or adjacent thereto.

Personnel are required to have the;

(1) Ability to understand and carry out written or oral information or instructions promulgated in OSHA law and Naval regulations or provided by Gas Free Engineers, Marine Chemists, and/or Certified Industrial Hygienists.

(2) Knowledge of structures, locations, and designations of spaces where work is done.

(3) Ability to calibrate and use testing equipment.

(4) Ability to accurately interpret test results of that equipment.

(5) Ability to perform all required tests and inspections which are or may be performed by a competent person as set forth in OSHA law and Navy regulations.

(6) Ability to determine the need for further testing by a Gas Free Engineer, Marine Chemist, or a Certified Industrial Hygienist.

(7) Ability to maintain records required by OSHA law and Navy regulations.

(8) Ability to specify the necessary protection and precautions to be taken to ensure the safety of employees as required by the particular regulation under the condition to which it applies.

This SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS) will be used to certify that personnel have completed the minimum

SERMC Maritime Confined Space Program  
SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS)

SERMC Safety SOP 27

NCP TRAINEE: \_\_\_\_\_

requirements, as specified in NAVSEA S6470-AA-SAF-010, necessary to be designated as a SERMC NCP.

A PQS Training binder be will established by each NCP candidate and it will be divided into six sections, to include:

- I. PREREQUISITES
- II. INSTRUMENT TRAINING
- III. SHIP'S SYSTEM AND SHIP REPAIR PROCESS FAMILIARIZATION
- IV. COMMAND SPECIFIC INSTRUCTIONS
- V. FIELD EXERCISES
- VI. COMPREHENSIVE FINAL EXAM
- VII. FINAL EXAM

A copy of a completed PQS package, along with required documents noted within, and a written designation letter, will be kept in the individual's training jacket.

**Section I**  
**PREREQUISITES:**

Personnel must have successfully completed one, or more, of the following courses. A copy of the certificate of completion will be maintained within training binder.

1. Naval Occupational Safety and Health and Environmental Training Center Course A-493-0030, Confined Space Safety.
2. "Gas Free Engineer and Gas Free Engineering Petty Officer for Surface (Afloat) Operations", Course K-495-0051.
3. "Damage Control Assistant", Course A-4G-0020 (recognizing that an integral part of this training course is instruction for certification as a GFE).
4. "Senior Enlisted Damage Control School", Course A-495-2055 (recognizing that an integral part of this training course is instruction for certification as a GFE).

SERMC Maritime Confined Space Program  
SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS)

SERMC Safety SOP 27

NCP TRAINEE: \_\_\_\_\_

5. A Naval Shipyard 40-hour Navy Competent Person Training Course.

## SECTION II INSTRUMENT TRAINING

Personnel will complete;

### A. MSA® Instrument training:

1. Log into the online MSA-U® TRAINING CENTER  
(<http://us.msasafety.com/training> )
  - a. ONLINE TRAINING  
(<http://msau.msasafety.com/login/index.php>)
  - b. Create an Account
2. Complete the following five Courses (drop down menu at the top of the MSA-U webpage) and save copies of certificates with this document.

*a. ALTAIR 5 IR Multigas Detector - Care & Use*

*b. ALTAIR 5X Multigas Detector - Simulator (as needed)*

*c. ALTAIR 5X PID - Bulb Cleaning*

3. Review and discuss with the GFE the following MSA Bulletins:

- a. Bump Test Frequency (ID 0800-76-MC / Oct 2013).

**Date reviewed/GFE init.:** \_\_\_\_\_

- b. MSA Portable Instrument Calibration (ID PR 08-0034/ May 2001).

**Date reviewed /GFE init.:** \_\_\_\_\_

- c. MSA Portable Gas Detection: Sensor Drift (ID 0800-78-MC / August 2013).

**Date reviewed/GFE init.:** \_\_\_\_\_

- d. MSA Portable Gas Detection: Electrochemical Oxygen Sensors and XCell® O2 Sensors (ID 0800-82-MC / October 2013).

**Date reviewed/GFE init.:** \_\_\_\_\_

SERMC Maritime Confined Space Program  
SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS)

SERMC Safety SOP 27

NCP TRAINEE: \_\_\_\_\_

- e. MSA Gas Detectors Display 20.8%: Standard Oxygen Reading  
(ID 0800-84-MC / September 2013).

**Date reviewed/GFE init.:** \_\_\_\_\_

- f. Combustible Gas Detector Sensor Drift: Catalytic vs.  
Infrared (ID 07-0035-MC / April 2010).

**Date reviewed/GFE init.:** \_\_\_\_\_

- g. ALTAIR® 5X Multigas Detector; Electrochemical Sensor  
Cross-sensitivity Data.

**Date reviewed/GFE init.:** \_\_\_\_\_

- h. Carbon Monoxide Sensor Cross-Sensitivities; Alcohols,  
VOCs & Hydrogen (ID 0800-81-MC / October 2013).

**Date reviewed/GFE init.:** \_\_\_\_\_

- i. MSA ALTAIR® Gas Detectors: Cold Weather Performance (ID  
0800-88-MC / December 2014).

**Date reviewed/GFE init.:** \_\_\_\_\_

- j. Photoionization Detectors (PIDs): Theory, Uses and  
Applications (ID 0803-11-MC / June 2015).

**Date reviewed/GFE init.:** \_\_\_\_\_

- k. Photoionization Detectors (PIDs): [Theory, Uses and  
Applications for First Responders, Law Enforcement  
Agents, HazMat and Fire Service Professionals.

**Date reviewed/GFE init.:** \_\_\_\_\_

**B. BACHARACH-PGM-IR (Portable Gas Meter Infrared) refrigerant  
meter Training**

1. Watch the following videos:

- a. <https://www.youtube.com/watch?v=4trfPXp5Sgg> PGM-IR  
Detecting Grocery Store Leaks - Getting Started (Part 1  
of 3) (5:18) To enter our meter menu you must press
- b. [https://www.youtube.com/watch?v=qB\\_cCqYUdh0](https://www.youtube.com/watch?v=qB_cCqYUdh0) Bacharach  
PAGM Leak Detector - Getting Started: Part 2 (8:02)



NCP TRAINEE: \_\_\_\_\_

- c. <https://www.youtube.com/watch?v=Yqx04beUfZg> PGM-IR  
Detecting Grocery Store Leaks - Sales Floor (Part 2 of 3)  
(12:03)

2. Complete SERMC BACHARACH-PGM-IR Familiarization training (available in Safety Office) and pass the *knowledge check* with an 80% or better (maintain a copy of the completed *knowledge check* within training binder).

### **SECTION III SHIP'S SYSTEM AND SHIP REPAIR PROCESS FAMILIARIZATION**

Satisfactorily complete the following training and save copies of certificates of completion, as applicable, with this document.

#### **1. General Knowledge:**

- a. **SERMC Shipboard Hot Work Awareness Training** (*ESAMS Web Training Course: #6479*)
- b. **SERMC Inorganic Arsenic Hazard Awareness Training** (*ESAMS Web Training Course: #7508*)
- c. **SERMC Cadmium Hazard Awareness Training** (*ESAMS Web Training Course: #7509*)
- d. **SERMC Hexavalent Chromium Hazard Awareness Training** (*ESAMS Web Training Course: #7510*)
- e. **SERMC Beryllium Hazard Awareness Training** (*ESAMS Web Training Course: #7717*)
- f. **SERMC Nickel Hazard Awareness Training** (*ESAMS Web Training Course: #7718*)
- g. **Confined Space Awareness Training (Shipboard)** (*ESAMS Web Training Course: #2570*)
- h. **Shipboard Nomenclature and Numbering** (*Navy eLearning course: SWOS CNE-BECC-0160-2.0-BECC - 16*)
- i. **Basic Chemistry of Fire** (*Navy eLearning course: SWOS CNE-BECC-0380-2.0-BECC-38*)

NCP TRAINEE: \_\_\_\_\_

j. **Firewatch Duties and Responsibilities** (*Navy eLearning course: SWOS CNE-BECC-0330-2.0-BECC - 33*)

k. **DC Post Fire Atmospheric Testing** (*Navy eLearning course: SWOS SWOS-DCA-51-PFATP-1.0*)

## 2. Ship's System Knowledge:

a. **Tanks and Voids** (*Navy eLearning course: SWOS CNE-BECC-0810-2.0-BECC-20*)

b. **Air Conditioning and Refrigeration** (*Navy eLearning course: SWOS CNE-BECC-0890-2.0-BECC Common Core - 28*)

c. **VCHT Sewage Systems Theory of Operation** (*Navy eLearning course: SWOS CNE-EPOC-ELO-25.03.01.03-00001*)

d. **VCHT Sewage Systems Theory of Operation** (*Navy eLearning course: SWOS CNE-EPOC-ELO-25.03.01.04-00001*)

e. **GSA Fuel Oil System Operations** (*Navy eLearning course: SWOS SWOS-GSA-05-FOS-1.0*)

f. **Shipboard Firemain System** (*Navy eLearning course: SWOS CNE-BECC-0170-2.0-BECC - 17*)

g. **Shipboard Drainage System** (*Navy eLearning course: SWOS CNE-BECC-0180-2.0-BECC - 18*)

## 3. Ship Repair Process (hot work and refrigerant) Knowledge:

a. **Silver Brazing Oxyacetylene Equipment** (*Navy eLearning course: CNE-BECC-1200-2.0-BECC Hull Technician*)

b. **Lincoln Electric®, Welding Safety Video Series & Resources** (<https://www.lincolnelectric.com/en-us/education-center/welding-safety/Pages/welding-safety.aspx>) click on "TAKE ME TO THE VIDEOS" and complete all six modules (1 hour 7 minutes)

c. **Shielded Metal Arc Welding Instruction** (*Navy eLearning course: Course ID: CNE-BECC-1210-2.0: BECC Hull Technician*)

SERMC Maritime Confined Space Program  
SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS)

SERMC Safety SOP 27

NCP TRAINEE: \_\_\_\_\_

- d. **Core Refrigeration - Refrigerant Safety** (15 minutes)  
<https://www.youtube.com/watch?v=doT9hZhFEbU>

**SECTION IV COMMAND SPECIFIC INSTRUCTIONS**

1. **Complete SERMC Training Modules (available in Safety Office and save copies of with this document):**

- a. MODULE I: INTRODUCTION  
b. MODULE II: LEGAL REQUIREMENTS TO REGULATIONS  
c. MODULE III: CHEMISTRY OF HM AND FIRE

2. **Attend SERMC Confined Space Awareness Training (Course 4549) at least twice:**

\_\_\_\_\_  
GFE (Signature and Date)

\_\_\_\_\_  
GFE (Signature and Date)

3. **Command Specific Processes applicable to Navy Competent Person duties**

**Review the following SERMC SOPs and discuss with GFE.**

1. **Maritime Confined Space Program, SOP 27**

\_\_\_\_\_  
GFE (Signature and Date)

2. **SERMC Afloat Hot Work Procedure, SOP 43**

\_\_\_\_\_  
GFE (Signature and Date)

SERMC Maritime Confined Space Program  
SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS)  
SERMC Safety SOP 27

NCP TRAINEE: \_\_\_\_\_

**SECTION V FIELD EXERCISES**

**Conduct supervised daily preparation of test equipment of;**

**Altair 5X IR (Carbon Dioxide, CO<sub>2</sub>, sensor)**

	Instrument	Date	GFE or designated NCP
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**Altair 5X PID (Photoionization Detector, Organic Compounds)**

	Instrument	Date	GFE or designated NCP
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SERMC Maritime Confined Space Program  
SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS)

SERMC Safety SOP 27

NCP TRAINEE: \_\_\_\_\_

**Bacharach PGM IR (Refrigerant meter)**

	Date	GFE or designated NCP
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SERMC Maritime Confined Space Program  
SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS)

SERMC Safety SOP 27

NCP TRAINEE: \_\_\_\_\_

**Conduct supervised tests and inspections of confined spaces**

- Spaces as defined in NAVSEA S6470-AA-SAF-010 including tanks and voids.
- Candidate is to identify adjacent spaces/associated systems and be able to recognize hazards associated with each.
- Candidate will identify requirements for posting and certifying spaces to ensure compliance with SERMC SOP 43 and NAVSEA S6470-AA-SAF-010.

	Space	Date	GFE or designated NCP
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SERMC Maritime Confined Space Program  
SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS)  
SERMC Safety SOP 27

NCP TRAINEE: \_\_\_\_\_

**Conduct supervised tests and inspections of enclosed spaces**

- Candidate is to identify adjacent spaces/associated systems/work operations and be able to recognize how spaces can become "poorly ventilated" as defined by NAVSEA S6470-AA-SAF-010.
- Candidate will identify requirements for posting and certifying spaces to ensure compliance with SERMC SOP 27 and NAVSEA S6470-AA-SAF-010.

	Space	Date	GFE or designated NCP
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SERMC Maritime Confined Space Program  
SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS)  
SERMC Safety SOP 27

NCP TRAINEE: \_\_\_\_\_

**Conduct supervised tests and inspections of SERMC (or OTHER supported DoN command) HOT WORK**

- Candidate is to identify adjacent spaces/associated systems/work operations and be able to recognize how spaces can become "poorly ventilated" as defined by NAVSEA S6470-AA-SAF-010.
- Candidate will identify requirements for posting and certifying spaces to ensure compliance with SERMC SOPs 27 and 35 and NAVSEA S6470-AA-SAF-010.

	Space	Date	GFE or designated NCP
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SERMC Maritime Confined Space Program  
SERMC NCP PERSONNEL QUALIFICATION STANDARD (PQS)  
SERMC Safety SOP 27

NCP TRAINEE: \_\_\_\_\_

**Conduct supervised tests and inspections or on-site training of systems for work involving CHT, AFFF, Oily waste, and Sea water systems**

- Candidate is to identify adjacent spaces/associated systems/work operations and be able to recognize how spaces can become "poorly ventilated" as defined by NAVSEA S6470-AA-SAF-010.
- Candidate will identify requirements for posting and certifying spaces to ensure compliance with SERMC SOP 27 and NAVSEA S6470-AA-SAF-010.

	Space	Date	GFE or designated NCP
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2			
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**Section VI FINAL EXAM**

**Successfully pass a one hundred question written test, administered by the GFE, with a minimum passing score of 85%.**

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Date Test completed/Score/GFE Signature.